

## Case Study

application	Stress Relief MSE Wire Faced Walls
location	Minneapolis, MN and Fargo, ND
product	Miragrid® 7XT, Miramesh® TR, Mirafi® HP570

job owner	Sanford Medical, MN Vikings/MSFA
engineer	Civil Design Professionals Gale-Tec Engineering
contractor	M.A. Mortenson, Ames Construction Co.
date of installation	11/2014, 09/2014

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TenCate develops and produces materials that function to increase performance, reduce costs and deliver measurable results by working with our customers to provide advanced solutions.

### THE CHALLENGE

There are many instances where stress relief walls are the most effective and economical solution when it is necessary to prevent imposed lateral loads on below grade structural walls. Sometimes the requirement is a temporary structure, as was the case for the new Sanford Medical Center in Fargo, ND. The timing and staging of this large hospital project made it imperative to not only prevent loading until the first floor was placed, but to gain elevation around the entire perimeter of the lowest structural wall to allow access for construction of the building. TenCate's Mirafi® Temporary Wirewall System was the appropriate site solution to achieve these objectives.

In other instances, a permanent stress relief structure is the best solution, as was the case for the Viking Stadium project in Minneapolis, MN. There was the usual load relief requirement but also a need to create a void area outside the structural wall with a space constraint for construction. TenCate's Mirafi® Permanent Wirewall System fit the project demands perfectly. The alternative was cast-in-place shear walls on footings to bedrock with rock anchors as was required for other locations around the building. The contractor identified that they were able to save 5.5 million dollars by using a CMU basement wall with the adjacent Mirafi® Permanent Wirewall System which is 700 ft. long and reaches a height of 40 ft.

### THE DESIGN

TenCate's Mirafi® Wirewall System was combined with a project specific design for each of these projects. Both project designs included steel wire forms at the face to save on labor

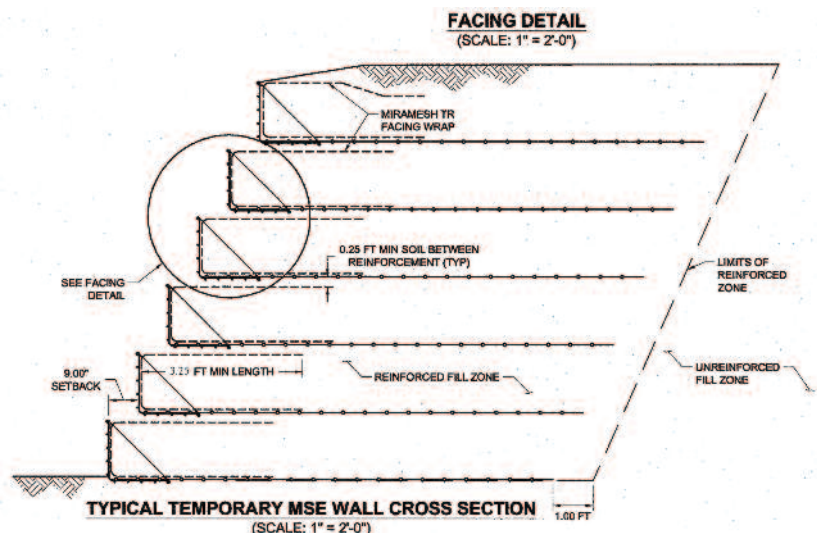
and support the facing material during construction. The Sanford Medical center temporary wall used Miragrid® 7XT for the primary reinforcement and Miramesh® TR for the facing option. The Miramesh® TR is designed for temporary applications and is manufactured in a dimension that saves labor and is flexible, making it easy to manipulate during construction. The design called for reinforcement at every 1.5' compacted soil layer with varying lengths to support different surcharge loads. One benefit of this wall system is the ability to easily vary slope angles and geometry. The temporary MSE structure needed to change inclinations to accommodate crane and man/material lift loads at certain locations where the wall needed to be vertical and also align to inside and outside angles proximate to the building. The wall is 2,000 ft. long, 14 ft. high and was in service less than a year. The steel forms were the same dimensions for both projects (W4 wire on 4"x4" spacing). The temporary wall wire forms did not need to be coated but the permanent wall forms required galvanizing.



Sanford Medical Center Fargo, ND after the wall system was backfilled.



Mirafi® Wirewall System.



Typical Mirafi® Wirewall System Detail.

Protective & Outdoor Fabrics

Geosynthetics

Aerospace Composites

Industrial Fabrics

Armour Composites

Synthetic Grass

The Viking Stadium permanent wall design used Miragrid® 7XT for primary reinforcement. It was also wrapped up the face over the secondary reinforcement facing, Mirafi® HP570, and inside the welded wire form. For particular locations, details had to be created to tie the Miragrid® reinforcement into concrete pile caps supporting a pedestrian bridge with an anchor system as well as intersecting pipe inclusions within the structure. The entire wall was designed at a near vertical angle in order to minimize the top of wall distance to the building.

### THE CONSTRUCTION

Another advantage of this wall system is that it affords latitude in construction options. Most stress relief walls need to be installed in close proximity to an existing building wall and other obstructions. The design, components and method of installation provide solutions for saving time and expense along with consideration to safety concerns. Both the temporary and permanent stress relief walls were accessed and constructed from the top and in back of the MSE structure face, eliminating the challenge of working between the building wall and the reinforced soil structure.

During construction of the temporary Mirafi® Wirewall System, the bottom lift of the structure was located 2' from the structural wall around the entire perimeter of the building. Consecutive lifts were set back 9" from each underlying lift face to achieve a 26.6° angle accept in critical load locations where it changed to near vertical. Each layer of compacted reinforced soil is 1.5' which is the height of the welded wire forms. The wire facing also served to accommodate a fall protection system to meet safety requirements.

The first course of the permanent Mirafi® Wirewall System was positioned the distance from the building set forth in the plans and has an inclination of near vertical.

This wall was designed with a geogrid and geotextile wrap facing that was placed inside the formwork to serve as both primary and secondary reinforcement.

### THE PERFORMANCE

Both structures performed and are performing as designed. In both instances, the TenCate Wall Systems saved time and money by reducing construction costs in labor and material as well as meeting project schedules.



Viking Stadium site, Minneapolis, MN.



Completed below grade Mirafi® Permanent Wirewall System providing void between the building wall.



Full height Mirafi® Permanent Wirewall System adjacent to concrete structural wall.



Mirafi® Permanent Wirewall System adjoining large crane pier.

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